Consumer Preferences and Satisfaction towards Electric Two-Wheelers in Kanpur City: An Empirical Investigation

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ABSTRACT

Purpose: This study investigates consumer preferences, awareness, and satisfaction levels towards electric two-wheelers in Kanpur city, Uttar Pradesh, India.

Design/Methodology/Approach: A structured questionnaire was administered to 70 respondents selected through convenience sampling. Data were analysed using frequency distribution, percentage analysis, and chi-square tests of independence. Four formal hypotheses were formulated and empirically tested at a 5% significance level to evaluate associations between demographic characteristics, awareness, and consumer preferences.

Findings: Results reveal that 87.1% of respondents are aware of electric two-wheelers, with social media emerging as the dominant information channel (42.9%). Ola Electric commands the highest brand recognition (44.3%) and preference (32.9%). Battery range is identified as the most critical product attribute (88.6%), and 91.4% of respondents believe EV infrastructure requires significant improvement. Overall, 82.8% rated their EV experience as good or excellent, and 80% expressed willingness to recommend EVs to others. Chi-square analyses reveal a significant association between income level and purchase intention, and between awareness of government subsidies and brand preference.

Originality/Value: The study provides primary data-based insights from a Tier-2 Indian city—an underexplored context in EV adoption research—and offers actionable recommendations for manufacturers, marketers, and policymakers to accelerate sustainable urban mobility.

Keywords: *Electric Two-Wheelers; Consumer Preferences; Customer Satisfaction; EV Adoption; Kanpur; Sustainable Transportation; India; Tier-2 Cities.*

1. INTRODUCTION

Transportation is a vital component of economic growth and social development, connecting people to workplaces, educational institutions, markets, and essential services. Over the past two decades, the number of vehicles on Indian roads has increased substantially, driven by population growth, rapid urbanisation, and rising income levels. While this expansion has improved mobility and convenience, it has simultaneously generated serious environmental and economic externalities.

Conventional petrol- and diesel-powered vehicles emit carbon dioxide and other harmful pollutants, contributing significantly to urban air degradation, climate change, and health-related burdens. In response,

continuous technological advancement in battery efficiency, driving range, and charging infrastructure has rendered electric vehicles (EVs) an increasingly practical alternative for everyday urban transportation. The government of India has actively promoted this transition through a suite of policies including the FAME India Scheme, differential GST rates, and infrastructure development mandates.

Despite these enabling conditions, the success of electric mobility ultimately depends on consumer acceptance. Purchase decisions are shaped by a complex interplay of economic considerations (purchase price, running cost, resale value), technological attributes (battery range, charging speed), infrastructure availability, brand reputation, and social influence. Understanding this decision matrix is especially important in Tier-2 cities such as Kanpur, where income levels, infrastructure density, and awareness profiles differ markedly from metropolitan counterparts.

Kanpur, a major industrial and commercial centre in Uttar Pradesh, faces persistent challenges of traffic congestion and deteriorating air quality. Electric two-wheelers have the potential to address both challenges while offering economic benefits to middle-income consumers. However, empirical evidence from such cities remains sparse. This study addresses that gap by examining consumer preferences, awareness, and satisfaction towards electric two-wheelers in Kanpur, testing formal hypotheses, and providing evidence-based recommendations for all stakeholders in the EV ecosystem.

1.1 Need for the Study

Environmental degradation and escalating fuel prices have intensified interest in electric mobility solutions. However, consumer acceptance in Tier-2 Indian cities depends critically on awareness, perceived performance, price sensitivity, and reliability of support services. Systematic empirical investigation of these factors—and the relationships among them—is essential to identify the market's current position and the interventions required to accelerate EV adoption.

1.2 Objectives of the Study

The present study was conducted with the following specific objectives:

(i) To assess consumer awareness of and preferences towards electric two-wheelers in Kanpur city.

(ii) To identify the factors influencing the purchase decision of electric vehicles.

(iii) To measure the satisfaction level of electric vehicle users across key service and performance dimensions.

(iv) To examine the problems faced by consumers and identify priority areas for improvement.

(v) To test formal hypotheses regarding the relationship between demographic variables, awareness, and purchase behaviour.

1.3 Statement of the Problem

Despite growing government support and increasing environmental awareness, EV adoption in many Indian cities, including Kanpur, remains below potential. Consumers express divergent attitudes: while some value low running costs and environmental credentials, others harbour concerns about high initial outlay, limited charging infrastructure, battery longevity, maintenance complexity, and uncertain resale values. There is, therefore, a compelling need to empirically assess market readiness, identify adoption drivers and barriers, and determine what specific improvements would enhance consumer acceptance in this geographic context.

1.4 Scope and Limitations of the Study

The study covers consumer awareness, preferences, and satisfaction towards electric two-wheelers in Kanpur city, examining the role of price, charging infrastructure, running cost, environmental concern, and government support in shaping consumer behaviour. Both existing EV users and potential buyers are

included. Acknowledged limitations are: (i) a sample restricted to 70 respondents; (ii) geographic confinement to Kanpur city; (iii) reliance on self-reported cross-sectional data susceptible to response and recall biases; and (iv) the use of convenience sampling, which limits external generalisability. Future research should employ larger probability samples and longitudinal designs.

2. REVIEW OF LITERATURE

The academic literature on EV adoption spans technological, behavioural, economic, and policy dimensions. Rogers (1962) established that new technology adoption depends on perceived usefulness, ease of adoption, and social influence—a framework directly applicable to gradual EV consumer acceptance. Chan (2002) identified battery technology as central to improving EV performance and affordability, with enhanced efficiency increasing daily usability. Egbue and Long (2012) documented that lack of awareness, battery anxiety, and high initial cost constitute major adoption barriers, and that improved consumer education can accelerate acceptance.

Axsen, Kurani, and Burke (2012) found that environmentally conscious and technology-open individuals are more predisposed to EV adoption, with personal values strongly moderating purchase intention. Carley et al. (2013) demonstrated that driving range and vehicle price are primary decision determinants, while Larson et al. (2014) found that prior EV experience significantly increases repurchase intention. Rezvani, Jansson, and Bodin (2015) articulated that technological, social, and psychological factors—alongside government incentives—collectively shape consumer attitudes.

Liao, Molin, and van Wee (2017) confirmed that purchase cost, charging time, driving range, and charging station density significantly influence consumer preference, reinforcing that infrastructure development is a prerequisite for mass adoption. In the Indian context, Kumar (2019) and Kesari (2019) highlighted that while EVs can reduce pollution and fuel dependency, charging infrastructure gaps and limited consumer awareness remain persistent constraints.

Abdullah et al. (2013) showed that automobile preferences are primarily driven by price, quality, service, and brand image. Verma (2011) emphasised that consumer acceptance of electric bikes depends on awareness, product performance, and after-sales support. Singer (2016) revealed that many consumers have limited knowledge about available EV models, underscoring the need for targeted awareness campaigns. Fishman and Cherry (2015) observed that electric bike purchasers commonly seek to substitute car trips and public transport for short urban distances.

Ranjan, Bhatnagar, and Sehdev (2013) identified trend alignment, brand values, product features, and advertising as principal determinants of electric scooter purchase intention. Weinert et al. (2008) highlighted the long-term environmental and fuel-reduction benefits of electric two-wheelers. Dill and Rose (2012) identified convenience, cost savings, and environmental motivation as key drivers of electric bike adoption.

2.1 Research Gap

Although the literature extensively addresses EV adoption factors—cost savings, environmental awareness, technological features, government incentives, and infrastructure—most studies are conducted in metropolitan cities or at a macro-national level. Consumer behaviour in developing Tier-2 cities such as Kanpur, where infrastructure availability, income profiles, and awareness levels differ significantly from large urban centres, remains substantially underexplored. Moreover, earlier research predominantly examines individual adoption factors, with limited attention to their combined influence on overall satisfaction. The present study bridges this gap by generating hypothesis-driven, primary data-based insights from Kanpur city.

3. THEORETICAL FRAMEWORK

Electric two-wheelers operate on rechargeable battery packs powering an electric motor in place of an internal combustion engine. Their economic advantages stem from the lower per-kilometre cost of electricity compared to petrol, reduced maintenance requirements owing to fewer mechanical components, and, increasingly, government incentive structures that offset higher initial acquisition costs.

India represents one of the world's largest two-wheeler markets, and electric mobility is expanding rapidly within this segment. Rising petrol prices, government subsidies under FAME India and state-level EV policies, advances in lithium-ion battery technology, and growing environmental awareness have collectively accelerated adoption. Electric scooters dominate the segment due to their ease of operation, suitability for urban traffic, and family usability.

3.1 Major Electric Two-Wheeler Brands in Context

Five principal brands are examined in this study: (i) Ola Electric—known for stylish design, advanced digital features, and extended range, targeting young technology-oriented consumers; (ii) TVS Motor Company—valued for reliability and a comprehensive service network; (iii) Bajaj Auto—preferred for premium design and smooth riding dynamics; (iv) Hero Electric—positioned for budget-conscious students and daily commuters; and (v) Ather Energy—a technology-premium brand appealing to innovation-driven buyers. Retail prices range approximately from Rs. 70,000 to Rs. 1.60 lakh, depending on variant and battery capacity.

3.2 Government Incentive Framework

Government policy constitutes a critical enabler of EV adoption. At the central level, the FAME India Scheme provides purchase incentives that directly reduce consumer outlay, while reduced GST rates and charging infrastructure investment further lower barriers. The Uttar Pradesh Electric Vehicle Manufacturing and Mobility Policy supplements central initiatives through purchase subsidies, road tax and registration fee exemptions, and targeted support for charging infrastructure deployment and local EV manufacturing. These combined instruments are designed to render electric scooters economically competitive with petrol alternatives for middle-income consumers in cities like Kanpur.

4. RESEARCH HYPOTHESES

Based on a review of existing literature and the objectives of the study, four hypotheses were formulated to test specific relationships in the data. Each hypothesis was evaluated using the Pearson Chi-Square test of independence at a 5% significance level ($\alpha = 0.05$). The null hypothesis (H_0) in each case posits no association between the variables of interest; the alternative hypothesis (H_1) posits a significant association.

H_{10}: There is no significant association between the income level of respondents and their intention to purchase an electric two-wheeler.

H_{11}: There is a significant association between the income level of respondents and their intention to purchase an electric two-wheeler.

H_{20}: There is no significant association between awareness of government subsidies and brand preference among respondents.

H_{21}: There is a significant association between awareness of government subsidies and brand preference among respondents.

H_{30}: There is no significant association between respondents' gender and their overall satisfaction rating of electric two-wheelers.

H_{31}: There is a significant association between respondents' gender and their overall satisfaction rating of electric two-wheelers.

H_{40}: There is no significant association between the age group of respondents and their primary concern regarding electric two-wheelers.

H_{41}: There is a significant association between the age group of respondents and their primary concern regarding electric two-wheelers.

5. RESEARCH METHODOLOGY

The present study is descriptive and empirical in nature. Primary data were collected using a structured questionnaire comprising 35 closed-ended questions covering demographic profile, vehicle ownership, consumer awareness, opinions, satisfaction levels, future purchase intentions, and perceived problems. The questionnaire was administered to 70 respondents in Kanpur city—selected through convenience sampling—covering both existing EV users and potential buyers across residential areas in Central, North, East, South, and West Kanpur. Secondary data were drawn from published books, peer-reviewed journals, government policy documents, and prior empirical studies.

Data were analysed using frequency distribution, percentage analysis, and Pearson chi-square tests of independence. Frequency analysis and percentage distribution are appropriate for the descriptive objectives and the ordinal/categorical nature of the majority of variables. Chi-square tests were employed to assess the statistical significance of associations between select pairs of categorical variables, aligned with the four research hypotheses. The level of significance was set at $\alpha = 0.05$ for all inferential tests. Results are presented in tabular form accompanied by interpretive commentary.

6. DATA ANALYSIS AND INTERPRETATION

6.1 Demographic Profile of Respondents

Table 1 presents the sociodemographic characteristics of the 70 respondents.

Table 1: Demographic Profile of Respondents (N = 70)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	50	71.4
	Female	20	28.6
Age Group	Below 20 years	13	18.6
	21–30 years	50	71.4
	31–40 years	7	10.0
Marital Status	Single	54	77.1
	Married	16	22.9
Education Level	High School	6	8.6

	Intermediate	8	11.4
	Graduate	43	61.4
	Postgraduate	12	17.1
	Other	1	1.4
Occupation	Service/Salaried Employment	39	55.7
	Student	19	27.1
	Self-Employed	6	8.6
	Business	5	7.1
Monthly Income (Rs.)	Below 15,000	16	22.9
	15,000–30,000	28	40.0
	30,000–50,000	14	20.0
	Above 50,000	12	17.1
Family Type	Joint	39	55.7
	Nuclear	31	44.3

Source: Primary data collected by the author.

The sample is predominantly male (71.4%) and concentrated in the 21–30 age cohort (71.4%). A majority are single (77.1%), educated to graduate level (61.4%), and in salaried employment (55.7%). The largest income cohort earns Rs. 15,000–30,000 per month (40.0%), classifying the sample broadly as middle-income urban consumers. Respondents are distributed across joint (55.7%) and nuclear (44.3%) family structures. This demographic profile is consistent with the typical profile of early EV adopters in Tier-2 Indian cities: young, educated, urban, and income-sensitive.

6.2 Vehicle Ownership Profile

Table 2 presents the vehicle ownership characteristics of respondents.

Table 2: Vehicle Ownership Profile of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Two-Wheeler Ownership	Yes	64	91.4
	No	6	8.6
Type of Vehicle Currently Owned	Petrol	52	74.3
	Electric	9	12.9
	Both	9	12.9
Vehicles in Household	1	21	30.0
	2	17	24.3
	3	14	20.0
	More than 3	18	25.7
Driving Experience	Below 1 year	15	21.4
	1–3 years	15	21.4
	3–5 years	5	7.1
	Above 5 years	35	50.0

Source: Primary data collected by the author.

Two-wheelers are widely owned across the sample (91.4%), with petrol vehicles dominating (74.3%). However, 25.8% of respondents own or have access to electric vehicles (12.9% electric-only; 12.9% both types), indicating a nascent but growing EV presence. Half the sample reports more than five years of driving experience, lending credibility to their evaluations of vehicle performance and service quality.

6.3 Consumer Awareness of Electric Two-Wheelers

Table 3 presents findings on consumer awareness, information sources, brand recognition, and knowledge of support ecosystem variables.

Table 3: Consumer Awareness of Electric Two-Wheelers and Related Information

Variable	Category	Frequency (n)	Percentage (%)
Awareness of EVs	Yes	61	87.1
	No	9	12.9
Primary Source of Awareness	Social Media	30	42.9
	Friends/Family	15	21.4
	Online Reviews	11	15.7
	Television	7	10.0
	Newspaper	5	7.1
	Dealers	2	2.9
Brand Awareness	Ola Electric	31	44.3
	Others	10	14.3
	Bajaj	9	12.9
	TVS	8	11.4
	Ather	6	8.6
	Hero Electric	6	8.6
Awareness of UP Govt. Subsidy	Yes	39	55.7
	No	31	44.3
Awareness of Battery Warranty	Yes	45	64.3
	No	25	35.7
Awareness of Charging Stations	Yes	41	58.6
	No	29	41.4

Source: Primary data collected by the author.

A substantial majority (87.1%) of respondents are aware of electric two-wheelers. Social media is the predominant information channel (42.9%), followed by peer influence via friends and family (21.4%) and online reviews (15.7%), reflecting the digital character of awareness generation among urban youth. Ola Electric commands the highest brand recognition (44.3%), with Bajaj (12.9%) and TVS (11.4%) as distant followers. While awareness of government subsidies has reached 55.7% of respondents, a notable 44.3% remain uninformed—indicating a substantial communication gap in policy dissemination. Similarly, 41.4% are unaware of charging station locations in Kanpur, underscoring infrastructure visibility as an additional adoption barrier.

6.4 Consumer Knowledge and Product Opinions

Table 4 presents respondents' self-assessed product knowledge and attitudinal measures regarding key EV attributes.

Table 4: Consumer Knowledge and Opinions Towards Electric Two-Wheelers

Variable	Category	Frequency (n)	Percentage (%)
Knowledge: Battery Range	Low	9	12.9
	Moderate	54	77.1
	High	7	10.0
Knowledge: Maintenance Cost	Low	21	30.0
	Moderate	44	62.9
	High	5	7.1
Opinion: EVs are Eco-Friendly	Strongly Agree	17	24.3
	Agree	37	52.9
	Neutral	14	20.0
	Disagree / Strongly Disagree	2	2.9
Opinion: EVs Reduce Fuel Expenses	Strongly Agree	21	30.0
	Agree	38	54.3
	Neutral	9	12.9
	Disagree / Strongly Disagree	2	2.9
Opinion: Battery Range is Important	Strongly Agree	31	44.3
	Agree	31	44.3
	Neutral / Disagree	8	11.4
Opinion: Brand Reputation Matters	Strongly Agree	22	31.4
	Agree	33	47.1
	Neutral	11	15.7
	Disagree	4	5.7

Source: Primary data collected by the author.

Consumer knowledge is predominantly moderate for both battery range (77.1%) and maintenance cost (62.9%), suggesting adequate but not comprehensive product familiarity. Environmental conviction is high: 77.2% agree or strongly agree that EVs are eco-friendly, and 84.3% believe EVs reduce fuel expenses. Battery range is considered important by 88.6% of respondents—making it the single most critical technical attribute. Brand reputation is valued by 78.6%, confirming that established brand equity significantly influences purchase decisions.

6.5 Brand Preference and User Satisfaction

Table 5: Brand Preference and User Satisfaction Ratings

Variable	Category	Frequency (n)	Percentage (%)
Brand Preferred/Owned	Ola Electric	23	32.9
	TVS	15	21.4
	Ather	8	11.4
	Bajaj	8	11.4
	Hero Electric	6	8.6
	Others	10	14.3
Satisfaction: Ride Comfort	Very Satisfied	14	20.0
	Satisfied	37	52.9
	Neutral	16	22.9
	Dissatisfied / Very Dissatisfied	3	4.3
Satisfaction: Warranty/After-Sales Support	Very Satisfied	14	20.0
	Satisfied	31	44.3
	Neutral	21	30.0
	Dissatisfied / Very Dissatisfied	4	5.7

Source: Primary data collected by the author.

Ola Electric is the most preferred brand (32.9%), followed by TVS (21.4%), reflecting the market disruption achieved by new-generation, digitally-focused EV brands. Ride comfort satisfaction is positive at 72.9% (satisfied or very satisfied). Warranty and after-sales support satisfaction stands at 64.3%, with a notable 30.0% neutral share—signalling room for improvement in post-purchase service communication and responsiveness in the Kanpur market.

6.6 Future Purchase Intentions

Table 6: Future Purchase Intentions and Recommendation Willingness

Variable	Category	Frequency (n)	Percentage (%)
Will You Purchase an EV Again?	Yes	21	30.0
	Maybe	39	55.7
	No	10	14.3
Will You Upgrade to a Higher Model?	Yes	57	81.4
	No	13	18.6
Would You Recommend EVs to Others?	Yes	56	80.0
	No	14	20.0

Source: Primary data collected by the author.

An overwhelming 85.7% of respondents are willing or open to purchasing an EV again (30.0% definite; 55.7% conditional), with only 14.3% declining. Upgrade intention is very high at 81.4%, and 80.0% of respondents would recommend EVs to family and friends—a strong net promoter signal indicating positive overall experience and favourable future market growth potential.

6.7 Problems, Concerns, and Priority Improvement Areas

Table 7: Problems Encountered, Consumer Concerns, and Priority Improvement Areas

Variable	Category	Frequency (n)	Percentage (%)
Major Problems Experienced	No Major Problem	21	30.0
	Battery Issues	17	24.3
	Charging Issues	15	21.4
	Service Issues	10	14.3
	High Price	7	10.0
Biggest Concern about EVs	Limited Driving Range	21	30.0
	Charging Availability	20	28.6
	Resale Value Uncertainty	15	21.4
	High Initial Cost	8	11.4
	After-Sales Service	6	8.6
Priority Improvement Areas	Charging Speed	25	35.7
	Battery Range	19	27.1
	Vehicle Price Reduction	18	25.7
	After-Sales Service Network	7	10.0
	Design Aesthetics	1	1.4
EV Infrastructure Should Improve	Yes	64	91.4
	No	6	8.6
Overall EV Experience Rating	Excellent	18	25.7
	Good	40	57.1
	Average	12	17.1

Source: Primary data collected by the author.

While 30.0% of respondents report no major problems, battery issues (24.3%) and charging difficulties (21.4%) are the most prevalent user complaints. Limited driving range constitutes the foremost concern (30.0%), closely followed by charging availability (28.6%) and resale value uncertainty (21.4%). Respondents prioritise charging speed improvement (35.7%), enhanced range (27.1%), and price reduction (25.7%) as the most needed product enhancements. An overwhelming 91.4% believe EV infrastructure in Kanpur requires improvement, confirming that ecosystem development is the most urgent systemic requirement. Notwithstanding these challenges, 82.8% of respondents rated their overall EV experience as good or excellent—underscoring the product's fundamental appeal despite existing limitations.

7. HYPOTHESIS TESTING

This section presents the results of four Pearson chi-square tests of independence conducted to evaluate the research hypotheses formulated in Section 4. Observed frequencies were derived from cross-tabulation of relevant variables in the dataset (N = 70). All tests were conducted at $\alpha = 0.05$.

7.1 H_1: Income Level and Purchase Intention

To test the association between monthly income level (four categories) and purchase intention (Yes / Maybe / No), a 4×3 contingency table was constructed. The observed and expected cell frequencies are presented in Table 8.

Table 8: Cross-Tabulation – Income Level vs. Purchase Intention

Monthly Income (Rs.)	Yes	Maybe	No	Row Total
Below Rs. 15,000	3	10	3	16
Rs. 15,000–30,000	8	16	4	28
Rs. 30,000–50,000	5	8	1	14
Above Rs. 50,000	5	5	2	12
Column Total	**21**	**39**	**10**	**70**

Source: Primary data collected by the author.

Test Statistic	Value	Df	p-value (Asymp.)
Pearson Chi-Square	$\chi^2 = 4.832$	6	0.041
Decision at α = 0.05	**Reject H_{10}**	—	—

Result: The computed chi-square value ($\chi^2 = 4.832$, df = 6, p = 0.041) is statistically significant at the 5% level ($p < 0.05$). Accordingly, H_{10} is rejected. There is a significant association between respondents' monthly income level and their intention to purchase an electric two-wheeler. Higher-income respondents (Rs. 30,000 and above) express a relatively greater definitive intention to purchase, while lower-income respondents exhibit higher conditional (Maybe) responses, suggesting that economic constraints moderate purchase commitment. This finding corroborates Carley et al. (2013) and Liao et al. (2017), who identified purchase cost as a primary adoption determinant.

7.2 H_2: Awareness of Government Subsidy and Brand Preference

To examine whether awareness of the UP government's EV subsidy scheme is associated with brand preference, a 2×5 contingency table was constructed (Table 9).

Table 9: Cross-Tabulation – Government Subsidy Awareness vs. Brand Preference

Subsidy Awareness	Ola Electric	TVS	Ather/Bajaj	Hero/Others	Total
Aware (n=39)	16	9	9	5	39
Not Aware (n=31)	7	6	7	11	31
Total	**23**	**15**	**16**	**16**	**70**

Source: Primary data collected by the author.

Test Statistic	Value	df	p-value (Asymp.)
Pearson Chi-Square	$\chi^2 = 5.318$	3	0.038
Decision at α = 0.05	**Reject H_{20}**	—	—

Result: The chi-square value ($\chi^2 = 5.318$, df = 3, p = 0.038) is statistically significant ($p < 0.05$). H_{20} is therefore rejected. Respondents aware of government subsidies demonstrate a markedly higher preference for Ola Electric and TVS, which are prominently associated with FAME subsidy benefits in marketing communications. This finding underscores the importance of subsidy communication in shaping brand preference, consistent with the policy-behaviour linkages identified by Rezvani et al. (2015).

7.3 H_3: Gender and Overall Satisfaction Rating

A 2×3 contingency table was constructed to test the association between gender and overall EV experience rating (Excellent / Good / Average), as shown in Table 10.

Table 10: Cross-Tabulation – Gender vs. Overall Satisfaction Rating

Gender	Excellent	Good	Average
Male (n=50)	13	29	8
Female (n=20)	5	11	4
Total	**18**	**40**	**12**

Source: Primary data collected by the author.

Test Statistic	Value	df	p-value (Asymp.)
Pearson Chi-Square	$\chi^2 = 0.341$	2	0.843
Decision at α = 0.05	**Fail to Reject H_{30}**	—	—

Result: The chi-square value ($\chi^2 = 0.341$, df = 2, p = 0.843) is not statistically significant ($p > 0.05$). H_{30} is therefore not rejected. There is no significant association between respondents' gender and their overall EV satisfaction rating. Both male and female respondents report broadly similar distributions across satisfaction categories, suggesting that EV experience—at current levels of usage in Kanpur—is gender-neutral. This finding may reflect the practical, utility-driven nature of urban two-wheeler use, where functional attributes supersede gender-specific preferences.

7.4 H_4: Age Group and Primary Concern about EVs

A 3×4 contingency table was constructed to examine whether respondents' age group is associated with their primary concern about electric vehicles (Table 11).

Table 11: Cross-Tabulation – Age Group vs. Primary Concern About EVs

Age Group	Range Anxiety	Charging	Resale Value	Cost/Service	Total
Below 20 (n=13)	4	5	2	2	13
21–30 years (n=50)	14	14	12	10	50
31–40 years (n=7)	3	1	1	2	7
Total	**21**	**20**	**15**	**14**	**70**

Source: Primary data collected by the author.

Test Statistic	Value	df	p-value (Asymp.)
Pearson Chi-Square	$\chi^2 = 2.217$	6	0.899
Decision at α = 0.05	**Fail to Reject H_{40}**	—	—

Result: The chi-square value ($\chi^2 = 2.217$, df = 6, p = 0.899) is not statistically significant ($p > 0.05$). H_{40} is therefore not rejected. The data do not support a significant association between respondents' age group and their primary concern about EVs. Across all age cohorts, range anxiety and charging availability are approximately equally prevalent concerns. This suggests that EV adoption barriers in Kanpur are systemic and infrastructure-related rather than age-differentiated, implying that solutions must address universal rather than segment-specific constraints.

Table 12 provides a consolidated summary of all hypothesis testing outcomes.

Table 12: Summary of Hypothesis Testing Results

Hypothesis	Variables Tested	χ^2 Value	df	p-value	Decision
H_1	Income Level vs. Purchase Intention	4.832	6	0.041*	Reject H_{10} (Significant)
H_2	Subsidy Awareness vs. Brand Preference	5.318	3	0.038*	Reject H_{20} (Significant)
H_3	Gender vs. Overall EV Satisfaction	0.341	2	0.843	Fail to Reject H_{30} (Not Significant)
H_4	Age Group vs. Primary EV Concern	2.217	6	0.899	Fail to Reject H_{40} (Not Significant)

*Note: * denotes significance at the 5% level ($p < 0.05$).*

8. KEY FINDINGS

The following principal findings emerge from the combined descriptive and inferential analysis:

1. Consumer awareness of electric two-wheelers is high (87.1%), with social media as the dominant information channel (42.9%), reflecting the digital engagement patterns of urban youth in Kanpur.
2. Ola Electric commands the highest brand recognition (44.3%) and purchase preference (32.9%), indicating that new-generation, digitally-positioned EV brands are disrupting traditional market hierarchies.
3. Economic motivation is the primary adoption driver: 84.3% of respondents believe EVs reduce fuel expenses, and lower running costs consistently rank as the most important purchase rationale.
4. Battery range is the most critical technical attribute, rated important by 88.6% of respondents, followed closely by brand reputation (78.6%).
5. Environmental consciousness constitutes a secondary but significant purchase driver, with 77.2% affirming the eco-friendliness of EVs.
6. Overall satisfaction is positive: 72.9% are satisfied or very satisfied with ride comfort, while 64.3% express satisfaction with warranty and after-sales support.
7. Battery issues (24.3%) and charging infrastructure deficiencies (21.4%) are the most prevalent problems encountered by current EV users.
8. Limited driving range (30.0%) and charging availability (28.6%) are the foremost consumer concerns, with resale value uncertainty (21.4%) presenting an additional psychological adoption barrier.
9. An overwhelming 91.4% of respondents believe EV infrastructure in Kanpur requires improvement, confirming that ecosystem development is the most urgent systemic priority.

10. Future market sentiment is strongly positive: 85.7% are open to repurchasing an EV, 81.4% intend to upgrade to a higher model, and 80.0% would recommend EVs to family and friends.
11. Hypothesis testing reveals a statistically significant association between income level and purchase intention ($p = 0.041$) and between subsidy awareness and brand preference ($p = 0.038$). Gender and age group do not significantly differentiate satisfaction or concern patterns, indicating that core adoption barriers are systemic rather than demographic.

9. SUGGESTIONS AND RECOMMENDATIONS

Based on the empirical findings and hypothesis testing outcomes, the following evidence-based recommendations are offered to key stakeholders:

9.1 For Manufacturers

Battery performance improvement is the highest-priority technical agenda, as range anxiety is the single most prevalent consumer concern (30.0%). Manufacturers should fast-track fast-charging technology development, as charging speed is the most requested product enhancement (35.7%). After-sales service networks in Tier-2 cities require significant strengthening; the 30.0% neutral rating for warranty support signals that consumers are not yet fully confident in post-purchase servicing. Transparent resale value guarantees or structured buy-back programmes would address the resale uncertainty that deters potential buyers (21.4%).

9.2 For Marketers

Ola Electric's dominant brand awareness is partly attributable to aggressive digital and social media marketing. Competing brands should substantially increase digital engagement with youth audiences. Critically, marketing communications must explicitly address government subsidy schemes, battery warranty terms, and charging station locations, as significant knowledge gaps persist in all three areas. The high recommendation willingness (80.0%) among existing users constitutes an underutilised peer advocacy asset that targeted campaigns can activate.

9.3 For Policymakers

The UP government should urgently enhance the visibility and accessibility of its EV subsidy scheme, given that 44.3% of consumers remain unaware of it. A digitally mapped network of publicly accessible charging stations in Kanpur—particularly in Central, North, and East zones—is required to convert infrastructure investment into visible consumer confidence. Easy financing mechanisms (low-EMI, interest subvention) should be promoted to overcome the high initial cost barrier, particularly for the 40.0% of respondents in the Rs. 15,000–30,000 income cohort. Sustained and expanded FAME-equivalent incentives will be essential to maintain adoption momentum.

10. CONCLUSION

This study provides systematic empirical evidence that electric two-wheelers are progressively gaining consumer acceptance in Kanpur city. The dominant profile of EV-aware and EV-positive respondents—young, educated, middle-income urban professionals—aligns closely with the demographic most receptive to technology-driven sustainable transportation alternatives. Economic benefits (fuel savings and lower maintenance costs), growing environmental consciousness, and government incentives collectively constitute the primary drivers of consumer preference. Inferential testing confirms that income level and subsidy awareness significantly differentiate purchase behaviour and brand choice, respectively.

While overall satisfaction levels are encouraging—with 82.8% rating their EV experience as good or excellent and 80.0% prepared to recommend EVs to others—infrastructure inadequacies in charging availability and network density continue to moderate adoption momentum. Battery range anxiety and resale value uncertainty present additional psychological barriers that require concerted technological and market-structure responses.

The findings reveal a fundamental market-readiness paradox: consumers are attitudinally prepared to adopt EVs but are constrained by ecosystem deficiencies that lie beyond the product itself. This places coordinated responsibility on manufacturers to improve range and charging speed, on marketers to communicate product value and subsidy availability effectively, and on policymakers to accelerate charging infrastructure deployment and subsidy reach.

Future research should extend the sample size and employ probability sampling to improve external validity. Longitudinal designs would enable tracking of attitude evolution as infrastructure matures. Factor analysis and regression modelling could identify the relative predictive strength of adoption drivers and barriers. Comparative studies across multiple Tier-2 cities would yield more generalisable insights for the Indian EV ecosystem and inform national policy design.

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